Abstract Submitted
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Zero dimensional model of atmospheric SMD discharge and afterglow in humid air[1] RYAN SMITH, EFE KEMANECI, BJOERN OFFERHAUS, KATHARINA STAPELMANN, RALPH PETER BRINKMANN, Ruhr Universitaet Bochum — A novel mesh-like Surface Micro Discharge (SMD) device designed for surface wound treatment is simulated by multiple time-scaled zero-dimensional models. The chemical dynamics of the discharge are resolved in time at atmospheric pressure in humid conditions. Simulated are the particle densities of electrons, 26 ionic species, and 26 reactive neutral species including: O_3, NO, and HNO_3. The total of 53 described species are constrained by 624 reactions within the simulated plasma discharge volume. The neutral species are allowed to diffuse into a diffusive gas regime which is of primary interest. Two interdependent zero-dimensional models separated by nine orders of magnitude in temporal resolution are used to accomplish this; thereby reducing the computational load. Through variation of control parameters such as: ignition frequency, deposited power density, duty cycle, humidity level, and N_2 content, the ideal operation conditions for the SMD device can be predicted. The described model has been verified by matching simulation parameters and comparing results to that of previous works (Sakiyama, 2012, J. Phys. D: Appl. Phys. 45, pp. 425201). Current operating conditions of the experimental mesh-like SMD were matched and results are compared to the simulations.

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